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Nos. 06-549; 06-340

In The Supreme Court of the United States

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY,

Petitioner,

v.

DEFENDERS OF WILDLIFE *et al.*,

Respondents.

NATIONAL ASSOCIATION OF HOMEBUILDERS *et al.*,

Petitioners,

v.

DEFENDERS OF WILDLIFE *et al.*,

Respondents.

On Writs Of Certiorari To The United States Court Of Appeals For The Ninth Circuit

BRIEF OF JARED M. DIAMOND, THOMAS EISNER, GORDON H. ORIANS, STUART L. PIMM, PETER H. RAVEN, DAVID S. WILCOVE, AND EDWARD O. WILSON AS *AMICI CURIAE* IN SUPPORT OF RESPONDENTS

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INTEREST OF THE *AMICI CURIAE*

Amici are prominent scientists in the fields of biology, botany, zoology, and ecology.[1] Their expertise enables them to understand and explain the ecological and economic importance of protecting imperiled species, as well as to explain the role science plays in the Endangered Species Act's species conservation scheme. Understanding the importance of biodiversity is necessary to appreciate fully why Congress enacted broad protections for species facing extinction. Additionally, appreciating lawmakers' emphasis on science as the foundation for the Endangered Species Act's key provisions illuminates the inherent inconsistency of reading into the statute a legally-based limitation on the scope of federal agencies' duties under section 7.

Amici include, in alphabetical order:

Jared M. Diamond is Professor and Vice Chair, Department of Physiology, UCLA Medical School. Dr. Diamond is an explorer of New Guinea bird fauna, and inventor of the concept of assembly rules in community organization. Since 1977, he has devoted much of his time to popular science writing including the bestselling books *Guns, Germs and Steel: The Fates of Human Societies*, for which he was awarded the Pulitzer Prize, and *Collapse: How Societies Choose to Fail or Survive*.

Thomas Eisner is the Jacob Gould Schurman Professor of Chemical Ecology at Cornell University, and Director of the

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[1] This brief was not authored in whole or in part by counsel for a party, and no person or entity other than the *amici* and their counsel made a monetary contribution to the preparation or submission of this brief. The parties have consented to the filing of *amicus* briefs and have filed letters of consent with the Clerk of the Court.

Cornell Institute for Research in Chemical Ecology (CIRCE). He is a world authority on animal behavior, ecology, and evolution, and is one of the pioneers of chemical ecology, the discipline dealing with the chemical interactions of organisms. He is a member of the National Academy of Sciences, and received the National Medal of Science in 1994.

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Stuart L. Pimm is the Doris Duke Professor of Conservation Ecology, Duke University. Dr. Pimm is a conservation biologist and ecologist, 1993 Pew Scholar in Conservation and the Environment, and author of *The Balance of Nature? Ecological Issues in the Conservation of Species and Communities* and *The World According to Pimm: A Scientist Audits the Earth.* Dr. Pimm's expertise lies in species extinctions and what can be done to prevent them. He also studies the loss of tropical forests and its consequences to biodiversity.

Peter H. Raven is Director of the Missouri Botanical Garden and the George Engelmann Professor of Botany at Washington University in St. Louis. Dr. Raven is past Chair of the Division of Earth and Life Studies, U.S. National Research Council. A MacArthur Fellow and member of the National Academy of Sciences and American Academy of Arts and Sciences, he is a world leader in the fields of plant evolution and systematics.

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Edward O. Wilson is Curator of Entomology at the Museum of Comparative Zoology, and Pellegrino University Professor Emeritus, Harvard University. Dr. Wilson's research interests include evolutionary sociobiology, biogeography, and ethical philosophy. A recipient of the National Medal of Science, he has written over a dozen books, including *On Human Nature* and *The Ants* for which he was awarded Pulitzer Prizes in 1979 and 1991, respectively. His book, *The Diversity of Life*, has been described as the sequel to Darwin's *Origin of Species*.

SUMMARY OF THE ARGUMENT

Amici are scientists who have dedicated their professional lives to studying species and ecosystems and the ways in which human actions can destroy – or save – these precious resources. Congress too recognized the importance of biodiversity and so enacted the Endangered Species Act (ESA), 16 U.S.C. §1531 et seq., a comprehensive, science-based approach to protecting the United States' most vulnerable species and the ecosystems upon which these species depend. Based on their extensive

studies and experience, *amici* provide in this submission a summary of some of the many benefits of biodiversity. Any actions, regardless of their classification or type, that adversely impact other native species will as a scientific matter lead to continued erosion of the enormous ecological, economic, scientific, aesthetic, cultural, and health benefits that biological resources provide, and that lawmakers have repeatedly and explicitly recognized.

Reversing course from earlier legislation that gave significant leeway to human actions that imperil other species, Congress enacted stringent, encompassing protections in the ESA designed to halt and reverse the accelerating trend toward species extinctions. Acknowledging that federal actions can threaten other species, the ESA mandates that federal agencies proceed with caution in order that their actions do not contribute to species' decline. Petitioners' effort to read a broad exception into application of this conservative approach threatens to significantly weaken federal protections for threatened and endangered species and the myriad benefits they represent – something that Congress itself has consistently refused to do.

Section 7 of the ESA also directs that science guide implementation of its provisions, with the pointed exception of possible exemptions from section 7's prohibitions granted by a high-level policy committee after a deliberate and exacting process. *Amici* firmly believe that interpreting section 7 as inapplicable to a host of "nondiscretionary" federal actions is directly at odds with the Endangered Species Act's emphasis on science and precaution as

touchstones of prudent management of this Nation's precious biological heritage.

ARGUMENT

I. CONSERVATION OF ENDANGERED AND THREATENED SPECIES PROVIDES SOCIETY WITH MYRIAD IMPORTANT BENEFITS.

President Nixon signed the Endangered Species Act (ESA) into law on December 28, 1973, declaring that "[n]othing is more priceless and more worthy of preservation than the rich array of animal life with which our country has been blessed. It is a many-faceted treasure, or value to scholars, scientists, and nature lovers alike and it forms a vital part of the heritage we all share as Americans." B. Burgess, *Fate of the Wild: the Endangered Species Act and the Future of Biodiversity* at 3 (2001). This Court termed the ESA the "most comprehensive legislation for the preservation of endangered species ever enacted by any nation." *Tennessee Valley Auth. v. Hill*, 437 U.S. 153, 180 (1978). It provides a means whereby "the ecosystems upon which endangered species and threatened species depend may be conserved, [and] . . . a program for the conservation of such endangered species and threatened species. . . ." The Endangered Species Act, 16 U.S.C §1531(b) (2000). As such, the statute takes a comprehensive scientific approach to conserving biodiversity, seeking to protect habitat and ecosystems crucial to protected species as well as promoting conservation of species themselves.

In its findings that explain the basis for enacting legislation to conserve species facing extinction, lawmakers declared that "these species of fish, wildlife, and plants

are of aesthetic, educational, historical, recreational, and scientific value to the Nation and its people." *Id.* at §1531(a)(3). In this section of their brief, *amici* provide information to demonstrate more precisely why Congress was absolutely correct in pointing out the myriad ways in which biodiversity provides benefits to society – and thus why lawmakers were justified in enacting a statute that contains comprehensive and broadly inclusive mandates to protect these benefits. Somewhat ironically, Congress also noted in the ESA's findings that economic growth and development untempered by adequate concern and conservation has led to many species' decline and even extinction. *Id.* at §1531(a)(1). While this is certainly true, advancements over the past three decades in both our knowledge and technology have demonstrated that species and ecosystems are in fact also crucial to the Nation's economic well-being, and are often the raw materials of socially beneficial economic growth and development. The following sections therefore also explain why broad protections for other species also make a great deal of sense from a purely economic standpoint.

It is telling that Congress, despite frequent urgings from some quarters to the contrary, has for many years refused to significantly weaken the ESA's broad protections for imperiled species. *Amici* submit that Representative Schneider provided perhaps the best explanation for this steadfast support for the ESA when she noted during 1985 reauthorization hearings that "[e]very time we reauthorize this legislation another set of 'user' groups comes before us to complain about the problems they are having because of the Endangered Species Act. I am sure these concerns are very real, but we must not lose sight of what is at stake here. The very survival of this planet

depends in large part on maintaining species diversity." *Endangered Species Act Reauthorization Hearings Before the House Subcomm. on Fisheries and Wildlife Conservation and the Environment of the House Comm. on Merchant Marine and Fisheries*, 99th Cong., 1st Sess. 3 (1985).

A. Ecological and economic importance of conserving listed species and the ecosystems upon which they depend.

At the most basic level, biodiversity is crucial to humankind's long term survival because we depend on a vast array of organisms to provide us with food, oxygen, nutrient recycling and other important life-sustaining functions. Scientists refer to these functions as ecosystem services. Scott Freeman & John C. Herron, *Evolutionary Analysis* 739 (1998); G. Daily et al., *Benefits Supplied to Human Societies by Natural Ecosystems*, 2 Issues in Ecology 1-18 (1997); *see also* Richard C. Primack, *Essentials of Conservation Biology* at 79-100 (1998). Such biological functions and services essential to human survival and welfare include soil formation, breakdown of wastes, and recycling of nutrients back into the soil which eventually provides humankind with food and other benefits. At a local scale, forests protect watersheds and thus the water supplies of many towns and cities, wild insect populations pollinate crops, and coastal ecosystems are the nurseries of commercially important fish stocks. Globally, vast ecosystems such as tropical rainforests, grasslands, wetlands, and forests also regulate composition of the atmosphere, perpetuate the water cycle, and have an important effect on climate. Freeman & Herron, *supra,* at 739. In 1997, scientists estimated the total economic

value of the renewable ecosystem services important to human health and welfare as between $16 and $54 trillion per year.[2] R. Costanza et al., *The Value of the World's Ecosystem Services and Natural Capital*, 387 Nature 253-260 (1997).

Individual species also play an important role in providing these ecosystem services. Some organisms, termed keystone species, play disproportionately important roles (relative to their numerical abundance) in the ecosystems in which they occur. Gray wolves, now protected under the ESA, provide an excellent example of a keystone species and its importance to the health of an entire ecosystem. David Todd, *Wolves – Predator Control and Endangered Species Protection: Thoughts On Politics and Law*, 33 S. Tex. L. Rev. 459, 478 (1992). The historic range of wolves once covered most of the United States. However, since they were thought of as pests, wolves were eradicated from most of the United States by the early 20th century. Hunters shot the last wolf in Yellowstone in 1926. *See* William J. Ripple and Robert L. Beschta, *Wolves and The Ecology of Fear: Can Predation Risk Structure Ecosystems*, 54 BioScience 755, 759 (2004). Seventy years later, FWS reintroduced wolves back into Yellowstone pursuant to the Endangered Species Act. Over the past

[2] The study's authors calculated that the estimated annual value of ecosystem services at the time, $33 trillion, was 1.8 times the global gross national product. Primack, supra, at 103. In the U.S., there is a growing awareness of the economic and practical importance of ecosystem services. In 1997 for example, New York City decided to spend over a billion dollars to purchase forested lands in the Catskills watershed to provide the city with drinking water – thereby avoiding $6 to $8 billion in costs for a mechanical water filtration system. See E.O. Wilson, *The Future of Life* 107-08 (2002).

decade, scientists have observed wolves changing ecosystem function in the greater Yellowstone area for the better. Wolf predation and hunting activities have reduced ungulate populations and changed herd movements; with less browsing pressure, riparian vegetation and aspen forest have increased significantly, improving riparian shade, stabilizing stream banks, and in turn increasing beaver and native fish populations. *Id.* Wolves are thus helping to restore lost ecosystem function and increase other wildlife populations in America's flagship national park, thus also providing benefits for humans ranging from improved water flows and reduced erosion to enhancing visitors' enjoyment of the park. *Id.*; *see also* Douglass Smith et al., *Yellowstone after Wolves*, 53 BioScience 330 (2003).

Other examples of such relationships are more subtle but no less important. Though many people view insects as trivial or even unpleasant species, they often perform invaluable ecosystem services. For example, an estimated 100,000 different species, including bees and flies, provide no-cost pollination services, including those that sustain a significant percentage of the globe's croplands. In the United States, the agricultural value of wild native pollinators is estimated in the billions of dollars per year. *See* Daily, *supra,* at 12. The continued availability of these natural pollination services depends on conserving the ecosystems upon which these species depend – a key goal of the Endangered Species Act.

Courts have both recognized and relied upon the economic and ecological value of wild species, including those protected by the ESA. For instance, in *National Association of Home Builders of the United States v. Babbit*, 130 F.3d 1041 (D.C. Cir. 1997), *cert. denied*, 524 U.S. 937 (1998), the District of Columbia Court of Appeals

emphasized the importance to its ecosystem of the descriptively named Delhi Sands flower loving fly *(Raphiomidas terminatus abdominalis)*. The court in that case noted that "[t]he Committee Reports on the ESA reveal that one of the primary reasons that Congress sought to protect endangered species from 'takings' was the importance of the continuing availability of a wide variety of species to interstate commerce." *Id.* at 1053-54. Quoting from the House report upon the enactment of the ESA, the Court of Appeals emphasized lawmakers' discussion of the potential future commercial uses of genetic and biological resources, concluding that "the extinction of species and the attendant decline in biodiversity will have a real and predictable effect on interstate commerce." *Id.*; *see also* Michael C. Blumm, *Flies, Spiders, Toads, Wolves, and the Constitutionality of the Endangered Species Act's Take Provision,* 34 Envtl. L. 309 (2004) (discussing the importance of biodiversity in the case). In also upholding the federal government's constitutional authority over endangered species found within a single state, the Fourth Circuit in *Gibbs v. Babbitt*, 214 F.3d 483, 494 (4th Cir. 2000), *cert. denied*, *Gibbs v. Norton*, 531 U.S. 1145 (2001), noted that recovery of red wolves could lead to tourism-related economic improvements running into the hundreds of millions of dollars.

B. Scientific value to the Nation and value to the health of its people.-

To the surprise of many in this technological age, humans garner a considerable amount of both health benefits and wealth directly from other species. For example, scientists initially derived a key ingredient of aspirin, perhaps the most widely used pharmaceutical in

the world, from a wild plant, meadowsweet. E.O. Wilson, *The Diversity of Life* 283 (1992). Cancer-fighting medicines made from compounds first isolated from rosy periwinkles (*Catharanthus roseus*) in Madagascar and from Pacific yew trees (*Taxus occidentalis*) – which are found in old growth forests in the northwestern U.S. – help thousands of patients each year. *The Diversity of Life*, *supra*, at 284; Freeman & Herron, *supra*, at 742. Currently, approximately 25% of all prescription drugs dispensed by pharmacies in the United States are based on substances first derived from plants, 13% come from microorganisms, and 3% from animals. *The Diversity of Life*, *supra*, at 283-84. Though science can now synthesize many of these compounds artificially, the chemical structure and properties of medicinal substances discovered in nature are often so novel that chemists operating in labs would almost certainly never have thought to create them; hence it is crucial to preserve wild species and the biochemical innovations they represent.[3] In addition to their incalculable health

[3] Lawmakers in fact anticipated such benefits when they passed the Endangered Species Act to protect wild species for future generations. The House report accompanying the final bill noted that "[w]ho knows or can say what potential cures for cancer or other scourges present or future, may lie locked up in the structure of plants which may yet be discovered, much less analyzed. Sheer self interests implore us to be cautious." TVA, 423 U.S. at 178 (quoting H.R. Rep. No. 93-412 at 4-5 (1973)). See also The National Biological Diversity Conservation and Environmental Act: Hearings on H.R. 4335 before the Subcomm. on Natural Resources, Agricultural Research and Environment of the House Comm. on Science, Space, and Technology, 100th Cong., 2d Sess. 342 (1988) (testimony of the American Pharmaceutical Association that "[i]t is alarming to consider that years ago, there might have existed a plant or microorganism that could have cured AIDS or other diseases, but that through inaction, that species became extinct.").

benefits, the commercial value of over-the-counter drugs directly extracted from plants alone was estimated in 1998 to be $20 billion in the United States and $84 billion worldwide. E.O. Wilson, *The Future of Life* 119 (2002).

In addition to the medical value that biological resources offer to humankind, wild organisms also offer improvements to agricultural practices and pest control. Agricultural practices focused on a limited number of single species monocultures, as Congress recognized, are extremely susceptible to failure as a result of disease, pests and other catastrophic natural disasters. *See* H.R. Rep. No. 259, 102nd Cong., 1st Sess. 14 (1991). This risk is particularly acute in an age of major industrial-scale agriculture, where thousands of acres may be cultivated with genetically identical individuals. Therefore, diverse gene pools and an abundance of wild organisms are essential to the ability to protect existing crops and produce new strains of food crops, as well as to development and maintenance of an efficient pest control system and disease resistance in our food supply.

In his book *The Diversity of Life*, *amicus* E.O. Wilson observed that "[m]erely the attempt to solve the biodiversity crisis offers great benefits never before enjoyed, for to save species is to study them closely, and to learn them well is to exploit their characteristic in novel ways." *The Diversity of Life, supra,* at 306 (1992). This illuminates the myriad possibilities that conserving the great variety of species have to offer to science. For example, some of the most important scientific discoveries in recent years were achieved with the help of extremophile bacteria living in thermal springs within Yellowstone National Park. In 1983, scientists succeeded in using one of the organisms found in this extreme environment, *Thermus aquaticus*, to

produce a heat resistant enzyme needed for synthesis of DNA. Ploymerase Cahin reaction, the manufacturing process developed as a result, is the foundation for genetic mapping. Such mapping of the human genome has become extremely important for medical purposes, as well as for uses such as crime detection and forensic medicine. *The Future of Life, supra,* at 127; *See also Yellowstone Thermophiles Conservation Project,* http://www.wfed.org/projects/yellowstone/project.htm (last visited March 21, 2007). Through protecting biodiversity and species within Yellowstone National Park, scientists were able to discover and use this unique organism, as a result opening the door to tremendous scientific, medical, and other benefits even yet untold.

Apart from utilitarian benefits, species are invaluable from a scientific perspective because of their great intrinsic value as repositories of the history and accumulated experiences of millions of previous life forms through species' continuous, evolutionary adaptation to a changing environment. Primack, *supra,* at 129. By conserving species, we can protect a storehouse of knowledge for future generations. Hawaiian honeycreepers, a family of birds known as the Drepanididae, serve as a prime example of the evolutionary and scientific significance of species. Honeycreepers are one of the best known examples of adaptive radiation. Found only in the Hawaiian Islands, this family consisted of over 45 species at the time the Polynesians settled Hawaii 2,000 years ago. All of these birds are believed to have evolved from a single species that arrived on the island chain by chance. Each species within the family has a specialized bill related to the type of food eaten by that particular species. For example, long billed honeycreepers feed on nectar, and short billed

honeycreepers specialize in cracking seeds. Primack, *supra*, at 30; *see also* J. Scott et al., *Conservation of Hawaii's Vanishing Avifauna*, 38 BioScience 232-253 (1988). The diversity of honeycreepers thus offers invaluable insight into the adaptation and evolution that species undergo, and thus advances scientific knowledge. However, most Hawaiian honeycreepers are either extinct or highly imperiled due to human activities, and to this day the surviving species face many ongoing threats to their existence. The Endangered Species Act protects over a dozen threatened and endangered honeycreeper species, as well as the knowledge they represent.

C. Esthetic, historical, and cultural importance.

Congress also recognized aesthetic and cultural values of ecosystems and species. Aesthetic arguments for preserving species revolve around values humans place on quality of life, and range from considerations such as enhanced property values, amenity benefits, and recreational opportunities in areas of greater species diversity to perceptions of beauty and tranquility. *See* Freeman & Herron, *supra*, at 742; *The Future of Life*, *supra*, at 187. The aesthetic value of species is also reflected in our art and photography, in our longing to keep pets and to cultivate gardens, and even in the growing ecotourism trade. Gretchen C. Daily and Paul R. Ehrlich, *Population Extinction and the Biodiversity Crisis, in Biodiversity Conservation: Problems and Policies* 47, C.A. Perrings et al., eds. (1995).

Culturally, species play a prominent role in the identity of indigenous peoples and contemporary nations, as well as an important role in the religious lives of many.

See Freeman and Herron et al., *supra*, at 743. The Jewish and Christian traditions hold that people have a stewardship duty to preserve biodiversity; Hinduism locates divinity in certain animals, and Buddhism and Jainism avoid unnecessary harm to life. Primack, *supra,* at 133. In addition, many native religions and cultural traditions focus on the energies of various species. The government of Papua New Guinea, for example, protects various species of birds-of-paradise (family Paradisaeidae) as a critical cultural resource. Freeman and Herron et al., *supra*, at 743.

In the United States, many species have important cultural value. Bald eagles are a prominent example. The national symbol of our country and an important species to many Indian tribes, bald eagles are still protected under the Endangered Species Act. At the time Congress enacted the ESA, the birds were virtually extirpated from the contiguous United States. Fortunately, bald eagles today serve as a success story of the ESA; without broad application of the statute, this country might today enjoy its national symbol only on posters and placards rather than soaring overhead.

A final literary example also serves to illustrate lawmakers' wisdom in enacting strong legal protections for biodiversity. Known to science as the California red-legged frog (Rana aurora draytonii), this species has been extirpated from 70 percent of its former range. Found today primarily in isolated wetlands and streams in coastal drainages of central California, California red-legged frogs were listed as threatened under the Endangered Species Act in 1996. 61 Fed. Reg. 96583 (1996). Most people know little of the biology or legal status of this species; it is instead immediately recognizable to most Americans as a cultural icon – the Celebrated Jumping Frogs of Calaveras

County. Mark Twain wrote of this venerated frog: "You never see a frog so modest and straightforward as he was, for all he was so gifted. And when it come to fair and square jumping on a dead level, he could get over more ground at one straddle than any animal of his breed you ever see . . . Smiley would ante up money on him as long as he had a red. Smiley was monstrous proud of his frog, and well he might be, for fellers that had traveled and been everywheres, all said he laid over any frog that ever they see." Mark Twain, *The Celebrated Jumping Frog of Calaveras County and Other Sketches* (1867). Thanks to the ESA, red-legged frogs are still in existence to jump long distances, preserving not only their genetic resources and their ecological and scientific value, but also maintaining a unique and important part of the cultural history of this country.

II. REGULATION OF ALL FEDERAL AGENCY ACTIONS UNDER SECTION 7 IS AN IMPORTANT ASPECT OF THE ENDANGERED SPECIES ACT'S PROTECTIONS FOR LISTED SPECIES.

A. The Endangered Species Act has proven effective in halting and reversing species decline in the United States.

The United States harbors an extraordinarily rich array of biological diversity. Though representing only 6% of the Earth's land area, this county contains portions of 12 of the world's 14 major ecosystem groups, known as biomes; by this measure the United States is the most ecologically diverse nation on the planet. M. Breyer et al., *More than the Sum of the Parts, in Precious Heritage* at 206, B. Stein et al., eds. (2000). Science has formally

described slightly more than 200,000 different species that live within the U.S., though the actual total most likely lies between 300,000 and 600,000 unique life forms present within this country. B. Stein, *A Remarkable Array: Species Diversity in the United States*, *in Precious Heritage, supra,* at 61. Many of these species exist nowhere else in the world; for example, more than a quarter of the country's vascular plants – including over 1,000 in Hawaii alone – are endemic to the United States. *Id.* at 69. Given that the dispute in the instant case arises under the Clean Water Act, it is particularly significant to note the global importance of this country's aquatic species. The approximately 800 species of freshwater fishes found in the U.S. comprise about 10% of the known freshwater fish species worldwide. The United States is also the most species-rich nation on Earth for other freshwater organisms, including freshwater mussels, snails, turtles, crayfish, and salamanders. *Id.* at 67.

Unfortunately, the United States' vast array of life presently faces severe threats, mostly as a result of human activities. More than 500 native species present at the time European settlers first came to this country are either extinct or no longer present in the United States. L. Master et al., *Vanishing Assets: Conservation Status of U.S. Species*, *in Precious Heritage, supra,* at 114. Some of these losses are well known, such as passenger pigeons, whose population plummeted from hundreds of millions to extinction over barely a century as a result of overexploitation by hunters coupled with loss of habitat. Other extinctions, including those of many bird species in Hawaii, took place out of the public eye with little fanfare. Presently, a growing percentage of the nation's plants and animals face an uncertain future; at least one-third of the

nation's known species are considered by scientists to be of conservation concern. *Id.* at 101. On a percentage basis, aquatic species top the list of the country's most imperiled organisms, disappearing at a rate of between two and five times that of terrestrial species. L. Helfrich et al., *Sustaining America's Aquatic Biodiversity: Why is Aquatic Biodiversity Declining?*, Virginia Tech Pub. No. 420-521 (2003). Nearly three quarters of freshwater mussel species in the United States face substantial risks to their continued existence, followed by crayfishes (over half of all U.S. species at risk), freshwater fishes (over one-third of all U.S. species at risk), and amphibians (also over one-third of all U.S. species at risk). L. Master et al., *supra*, at 102.[4]

The United States currently lacks any comprehensive national strategy to manage and safeguard its biological resources. A wide variety of federal laws, programs, and tax policies require or encourage conservation of species and habitats, supplementing a similar array of such mechanisms at the state and local level. However, these initiatives vary greatly in their coverage and effectiveness. For example, a decade ago Congress enacted organic legislation for the nation's collection of federal wildlife refuges, calling on the U.S. Fish and Wildlife Service (FWS) to plan and direct the growth of the refuge system

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[4] Indeed, in its opinion in TVA v. Hill, 437 U.S. 153, 178 (1978), this Court singled out a statement by the Assistant Secretary of Interior who, in explaining to Congress the need for legislation to protect imperiled species, pointed in particular to vanishing mollusks in the Southeastern United States. Though admitting to uncertainty about the importance of such species, the Assistant Secretary noted that he had "great trouble being party to their destruction without ever having gained such knowledge." Id.

to "contribute to the conservation of the ecosystems of the United States." 16 U.S.C. §668dd(a)(4)(C). However, the federal Wildlife Refuge System, as a result of historical acquisition and designation priorities that often favored waterfowl and game species, currently harbors less than 10% of total number of species formally listed as threatened or endangered in the United States. C. Groves et al., *Owning Up To Our Responsibilities: Who owns Lands Important to Biodiversity?*, *in Precious Heritage, supra,* at 283.

In the absence of an overall federal approach to managing biodiversity, the federal Endangered Species Act (ESA) has assumed an increasingly prominent role in efforts to conserve species and their habitat in the United States. The statute's ever-increasing importance to the nation's biodiversity conservation efforts also stems from the growing number of species facing the possibility of extinction; the statute currently protects over 1,000 species found within the United States as endangered, as well as more than 300 species listed as threatened. U.S. Fish and Wildlife Service, http://ecos.fws.gov/tess_public/Boxscore.do (visited March 14, 2007).[5] Reflecting biological trends, aquatic species make up nearly one-fifth of those listed on the threatened and endangered rolls. *See id.*

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[5] Significantly, however, the ESA's lists of threatened and endangered species likely significantly understate the number of life forms in the United States facing extinction. The actual number of species deserving of legal protections may be ten times the number species currently listed. See D. Wilcove et al., *How Many Endangered Species Are There in the United States?*, 3 Frontiers in Ecology and the Environment 414 (2005).

Recent studies indicate that when species are designated for protection under the ESA, the statute has been effective at halting and reversing their slide toward extinction. Using data on species status reported over a 14-year period by the U.S. Fish and Wildlife Service, an interdisciplinary research team found a strong correlation between listing under the ESA and the likelihood that a species' conservation status was improving. M. Taylor et al., *The Effectiveness of the Endangered Species Act: A Quantitative Analysis*, 55 BioScience 360 (2005). Based on findings that species listed for a longer period of time were more likely to be classified by FWS as improving in status and less likely to be declining, these researchers also concluded that protection under the ESA provides listed species with conservation benefits that accumulate over time, particularly in the initial years after a species was placed on the endangered and threatened lists.

The significant positive link between the time a species is protected by the ESA and the likelihood that its conservation status is stable or improving was confirmed by a second investigation, which also used data reported by FWS. Among species whose conservation status was known by FWS, researchers found only 23% of species listed for less than two years were classified as improving, whereas 68% of species that had been protected by the ESA for 13 years or more were improving. T. Male and M. Bean, *Measuring Progress in US Endangered Species Conservation*, 8 Ecology Letters 986 (2005). Perhaps not surprisingly, this study also noted a strong positive link between government expenditures on recovery measures and the likelihood that a species' status was improving. Sounding an alarming note for some aquatic species in particular, the research team noted that freshwater

mussels had the worst status trend among species they examined, though many of these species were extremely imperiled when they were added to the protected lists and more than half of these species had been listed for less than 12 years.

Recognizing the Endangered Species Act's important role in providing "emergency room" protections for species whose declines have put them at risk of extinction, as well as the law's increasing prominence in influencing biodiversity conservation efforts generally, scientists and scientific organizations have consistently voiced strong support for maintaining and effectively implementing the statute. For example, in February 2006 joint statement opposing efforts to modify the Endangered Species Act's scientific standards, the American Fisheries Society, Ecological Society of America, Entomological Society of America, Society for Conservation Biology-North America, Society for Range Management, and The Wildlife Society – professional organizations which collectively represent thousands of scientists – declared that "[t]he ESA is a vital and fundamentally sound tool in this Nation's efforts to maintain biological diversity." Scientific Societies' Statement on the Endangered Species Act, February 27, 2006 (available at http://www.conbio.org/Sections/NAmerica/NAPolicy.CFM#NA20060227).

B. The procedural and substantive provisions of section 7(a)(2)'s consultation process provide crucial legal protections for a substantial number of listed species and their habitat.

As this Court has consistently recognized, the substantive and procedural requirements set forth in section

7(a)(2) of the Endangered Species Act, 16 U.S.C. §1532(a)(2), are among the most important and influential of the statute's protections for listed species. *See, e.g., TVA v. Hill*, 437 U.S. 153, 173 (1978); *Bennett v. Spear*, 520 U.S. 154, 169 (1997).

Because the requirements of section 7(a)(2) apply to the actions of federal agencies, these legal provisions play an especially crucial role in conserving listed species that occur on federal land. The federal government owns approximately 400 million acres of land in the United States outside Alaska. While most of these land holdings are concentrated in the western states, federal lands within other states also contain areas with substantial biological value. Federal lands in Florida's Everglades and on barrier islands along the Gulf of Mexico coast provide examples of public land holdings that, while not large in absolute terms, play an outsized role in terms of biodiversity conservation. Together, federal lands support populations of nearly three-fifths (59%) of the species protected under the ESA. Groves, *supra,* at 278-79. This means that section 7's prohibitions against actions that jeopardize listed species or destroy or adversely modify critical habitat – which apply to all decisions by federal land managers – directly and substantially influence what happens to populations of, and habitat for, the majority of threatened and endangered species in the United States.

Though the requirements of section 7 of the ESA apply exclusively to the actions of federal agencies, this section of the statute nonetheless also provides significant protections for threatened and endangered species and their habitat on non-federal land. Regulations implementing section 7 define agency "action" to include "all activities or programs of any kind authorized, funded, or carried

out, in whole or part, by Federal agencies in the United States or upon the high seas." 50 C.F.R. §402.02. Many activities that affect listed species on non-federal land require a federal permit or depend to some degree on federal funding. Wetlands, for example, provide habitat for many threatened and endangered species. Before significantly altering most wetland areas, a landowner must first obtain a permit from the U.S. Army Corps of Engineers pursuant to section 404 of the Clean Water Act, 26 U.S.C. §1344(a); if the action may affect listed species or destroy or adversely modify designated critical habitat, the Corps must comply with the requirements of section 7. Other actions by federal agencies that affect threatened and endangered species on non-federal land, such as funding for road and highway construction, registration of pesticides, granting hydropower licenses, and even providing federal flood insurance, must comply with the procedural and substantive mandates of section 7 before the relevant federal agency may finalize its action.

The number of section 7 consultations between the ESA's designated "expert" agencies – FWS and the National Marine Fisheries Service (NMFS) – and other federal agencies whose actions may affect listed species or critical habitat provide a good gauge of the importance of section 7's protections for threatened and endangered species. FWS alone conducted over 300,000 formal and informal section 7 consultations[6] with other federal

[6] Regulations implementing section 7 provide for an exception to the ESA's statutory or "formal" process for consultation if a federal agency proposing an action determines, with written concurrence from FWS or NMFS, that its proposed action is not likely to adversely affect any listed species or critical habitat. See 50 C.F.R. §402.14(b).

agencies during the years from 1998-2002. FWS, Consultations With Federal Agencies, www.fws.gov/endangered/consultations/consultations.pdf (visited March 14, 2007). Since the consultation requirement is not triggered unless a proposed federal action "may affect" listed species or designated critical habitat, *see* 50 C.F.R. §402.14(a), the large number of section 7 consultations that take place each year indicate the correspondingly vast number of federal actions that may affect conservation of threatened and endangered species and their habitat. Moreover, all of these consultations involve careful analysis of the impact a proposed action is likely to have on listed species, and many result in modifications to original proposals by federal agencies in order to avoid or minimize adverse impacts on these species and their habitat.[7] Cumulatively, therefore, the requirements of section 7 result in a huge amount of analytical work on the impacts of a wide array of activities on listed species, and they lead to many actions that help prevent or at least slow erosion of the nation's biological resources.

Finally, from a scientific perspective, section 7 is particularly crucial to species conservation efforts because unlike the ESA's prohibition against actions that "take" protected species, the section 7 process embodies a more

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[7] Federal agencies often modify their actions in order to reach a finding that an action is not likely to adversely affect listed species or critical habitat, thus allowing them to avoid section 7's formal consultation process. See 50 C.F.R. §402.14(b). Moreover, biological opinions that result from the "formal" consultation often contain "incidental take statements" that must set forth "reasonable and prudent measures" (and associated "terms and conditions") designed to minimize the impact of incidental take, i.e., unintended death or injury, to listed species. 16 U.S.C. §1536(b)(4)(C)(iii) and §1536(b)(4)(C)(iv).

precautionary approach to protecting biodiversity. Section 9 of the ESA, 16 U.S.C. §1538(a)(1)(B), forbids the "take" of endangered species of fish and wildlife (and, under applicable regulations, most threatened species), defined to include such actions as killing or capturing individual members of a species; it also bans activities that "harm" protected species, including actions that actually kill or injure listed species by significantly modifying or degrading habitat. *Id.*; 50 C.F.R. §17.21; §17.31; and §222.102. *See generally, Sweet Home Chapter, Communities for a Great Oregon v. Babbitt*, 515 U.S. 687 (1995).[8] While these prohibitions allow prosecutors to seek civil and criminal penalties against those who have unlawfully taken protected species, they focus on after-the-fact penalties rather than preventative conservation measures. It is possible for federal agencies or interested third parties employing the ESA's citizen suit provision to enjoin actions likely to result in unlawful take of species in the future, but they face a potentially steep burden of proof. For example, in *National Wildlife Federation v. Burlington Northern Railroad Inc.*, 23 F.3d 1508 (9th Cir. 1994), the court rejected arguments that a grain spill near railroad tracks would continue to result in deaths to grizzly bears despite the fact that accidents had previously occurred at the site. The court asserted that showing a violation of section 9 requires "a definitive threat of future harm to protected species, not mere speculation." *Id.* at 1512, n. 8.

The prohibitions Congress set forth in section 7 to protect listed species, on the other hand, emphasize *preventing* adverse impacts to biodiversity. Lawmakers in

[8] Endangered and threatened plants receive somewhat lesser protections under section 9; see 16 U.S.C. §1538(b).

1973 characterized the ESA as the "institutionalization of . . . caution." *TVA v. Hill*, 437 U.S. at 178 (1978) (quoting H.R. Rep. No. 93-412, pp. 4-5 (1973)). Section 7 takes a precautionary approach to management of listed species and their habitat by directing that federal agencies "insure" that their actions are not likely to jeopardize these species or destroy or adversely affect critical habitat. 16 U.S.C. §1536(a)(2). Uncertainty is a constant in science, and there is a great deal we do not know about the biological world around us, particularly involving imperiled species. Section 7's requirement that agencies analyze their actions in advance, as well as its mandate that federal actors insure against significant harm to protected species and their critical habitat, thus stands as one of the most important provisions of federal law dealing with biodiversity conservation.

C. Section 7's emphasis on science favors interpreting its prohibitions to apply to all federal actions that are not granted an exemption by the Endangered Species Committee.

Upon reading the entirety of section 7 of the Endangered Species Act, one is left with the unmistakable impression that Congress based its plainly-worded provisions on a foundation of science. Decades ago, the great naturalist Aldo Leopold observed that "[t]o keep every cog and wheel is the first precaution of intelligent tinkering." A. Leopold, *A Sand County Almanac* at 177 (1949). Lawmakers heeded this sound advice in enacting the Endangered Species Act, specifically noting that a cautious approach to management of the nation's biological resources was "at the heart" of the law. H.R. Rep. No. 93-412, pp. 4-5

(1973). Section 7 in particular reflects this precautionary, science-based approach to preventing extinctions. Several factors demonstrate lawmakers' unmistakable intent to apply the substantive prohibitions of section 7(a)(2) to all federal agency actions, save those expressly granted an exemption: the plain language of this section of the statute, coupled with its emphasis on science; the exacting scientific procedures set forth throughout the complimentary provisions of section 7; and the inclusion of a detailed exemption process that expressly allows only a high-level policy body, after exacting consideration of both biological and non-biological factors, to elevate non-scientific considerations over the biological needs of a listed species in specific instances.

Section 7(a)(2) employs the terminology and clear language that science often uses to denote a high degree of certainty. It directs federal agencies to employ the "best scientific and commercial data available" in carrying out their responsibilities to avoid taking actions likely to jeopardize listed species or destroy their critical habitat. 16 U.S.C. §1536(a)(2). It also frames this mandate expansively, providing that these prohibitions apply to "*any* action authorized, funded, or carried out" by a federal agency. *Id.* (emphasis added). Moreover, as noted above, Congress directed agencies to "insure" that their actions are "not likely to" lead to the prohibited results. *Id.* Lawmakers added the phrase "not likely to" to section 7 in 1979, but nonetheless explained that they still meant for agencies to give listed species "the benefit of the doubt." H.R. Conf. Rep. No. 697, 96th Cong., 1st Sess. 12, reprinted in 1979 U.S. Code Cong. & Admin. News 2572, 2576. Together, these elements of the law's plain wording indicate that Congress sought to enact into federal law

Aldo Leopold's wise, science-based counsel: Guided by the best science, do not allow *any* actions that threaten the existence of imperiled species or the habitat that sustains them.

Other provisions of section 7 that support its basic substantive mandates to avoid federal actions that jeopardize listed species or destroy critical habitat also reflect a comprehensive, science-based approach to protecting biodiversity. Prior to undertaking an action where listed species may be present, a federal agency must perform a biological assessment to identify species likely to be affected by its action and determine the extent of those effects. *See* 16 U.S.C. §1536(c)(1); 50 C.F.R. §402.12(a). Agencies may not take steps toward completing a proposed action that would foreclose options which would avoid conflicts with conservation of listed species. *See id.* at §1536(d). Moreover, the dominant procedural mechanism of section 7 – consultation between agencies with expertise in biodiversity conservation and those whose actions may affect listed species and their habitat – reflects standard practices in science, namely sharing of expertise and peer review. Together, these procedural elements of section 7 also demonstrate Congress' deliberate construction of an analytical, cautious approach to proceeding with federal actions that may affect threatened and endangered species and their habitat. A reading of section 7 that exempts whole categories of federal actions from the requirements of section 7 would be inconsistent with this systematic and scientific process.

Finally, prompted by this Court's decision in *TVA v. Hill*, *supra*, Congress added to section 7 a distinct and detailed process that allows a high-level policymaking body to grant exemptions from the section's otherwise

science-based mandates. *See generally* 16 U.S.C. §1536(e) through §1536(p). This separate exemption process emphasizes the distinction between the comprehensive, science-based requirements discussed above and the specific circumstances under which designated officials may consider non-scientific factors in deciding whether a federal action may proceed notwithstanding its impacts on protected species. Perhaps more significantly, it also emphasizes lawmakers' view of the gravity of a decision to allow a federal action to proceed in the face of information indicating that it would jeopardize a listed species or destroy critical habitat. Only a Cabinet-level committee – or the President within declared disaster areas – may grant exemptions to the substantive mandates of section 7. *See id.* at §1536(e); §1536(p). Moreover, the Endangered Species Committee may grant exemptions only after a series of exacting procedures, including public notice and a formal adjudicatory hearing. *See id.* at §1536(g)(2)(B)(ii); §1536(g)(4). Additionally, no exemption may be granted in the absence of a biological assessment of the proposed action's effects on listed species. *See id.* at §1536(g)(3)(A)(ii). This indicates that lawmakers were unwilling to allow even individual federal actions to be exempted from section 7 without first requiring scientific scrutiny of their impacts on listed species.

Section 7's exacting exemption process stands in stark contrast to an interpretation of section 7 that would make the substantive protections of this section inapplicable to an indeterminate and potentially broad array of federal agency actions. Rather than being carefully weighed by high-ranking public officials, adoption of the position advanced by Petitioners could permit decisions exempting various federal agency actions from section 7 to be made routinely by agency administrators and government

counsel. Moreover, these exemptions from the requirements of section 7 would necessitate no public notice and, perhaps of more concern, would not require federal agencies to consider or even identify projects' impacts on threatened and endangered species. These outcomes are not consistent with the painstaking and narrow exemption process that Congress added to section 7 in 1978 in order to allow for careful consideration of exceptions to this section's key prohibitions. The exacting exemption process in the statute accounts for the importance and potential finality of a decision that can place the future of an imperiled species in doubt or even consign it to extinction. It is, therefore, virtually inconceivable that lawmakers simultaneously intended to allow a host of so-called "nondiscretionary" federal agency actions – which could lead to similarly disastrous biological results – to proceed unregulated by the ESA.

III. CONCLUSION.

For the foregoing reasons, *Amici* respectfully request that this Court affirm the decision of the Ninth Circuit Court of Appeals.

Respectfully submitted,

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